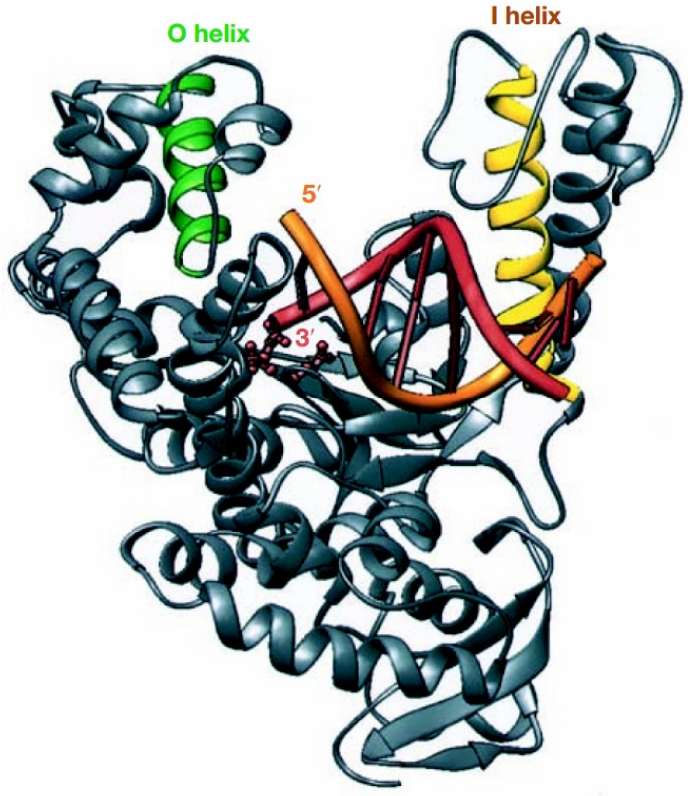
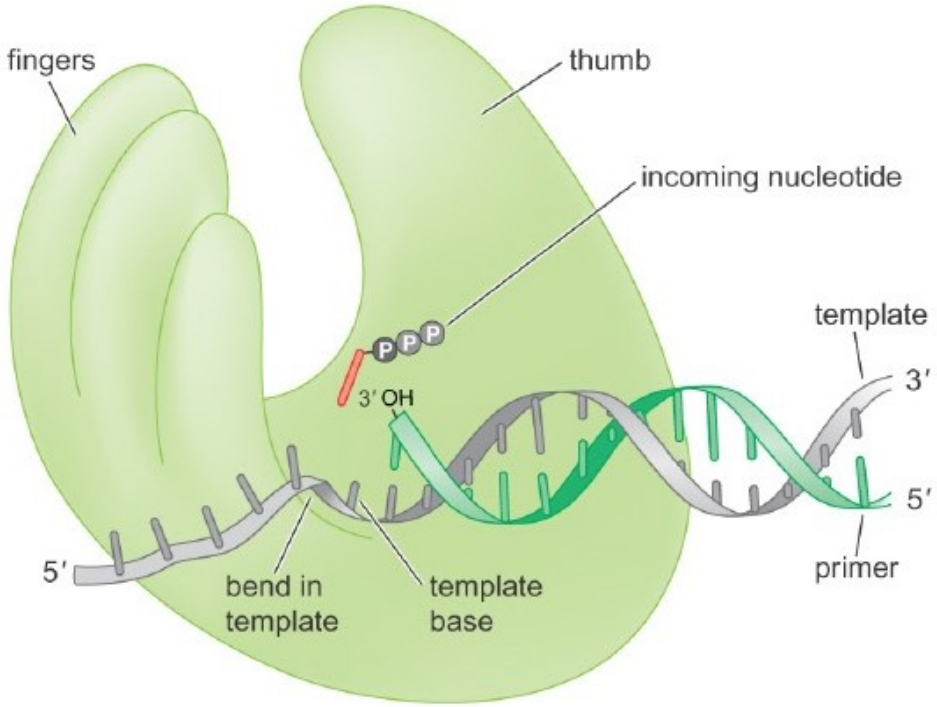

DNA
Replication
---Enzyme
By Nanjing_NFLS

DNA Polymerase

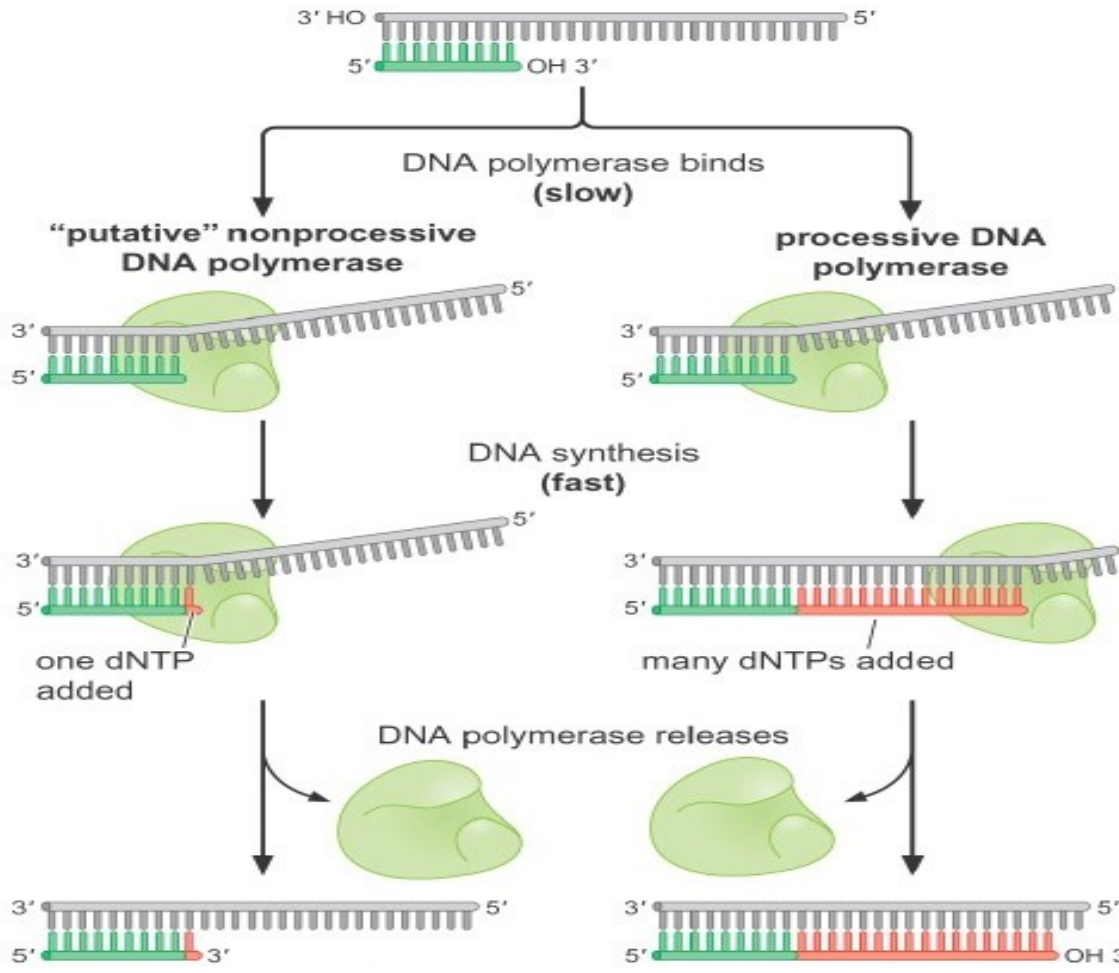




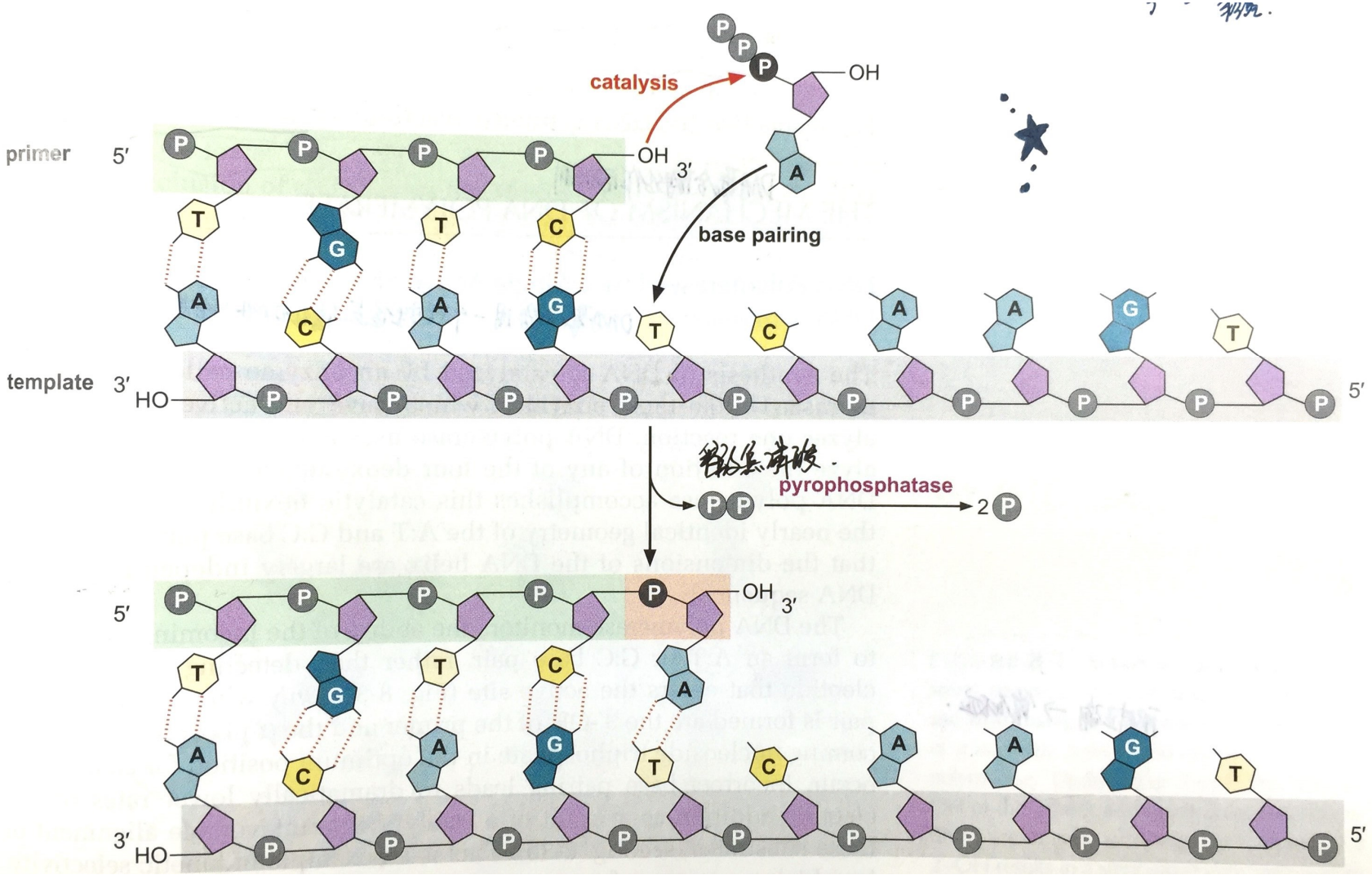
Cocrystal structure of *Taq* DNA polymerase with a double-stranded model DNA template (orange).

Function of DNA polymerase

- Identify the double chain
- Extending primers from 5' to 3' ends using free dNTPs
- Error correction (proofreading) function

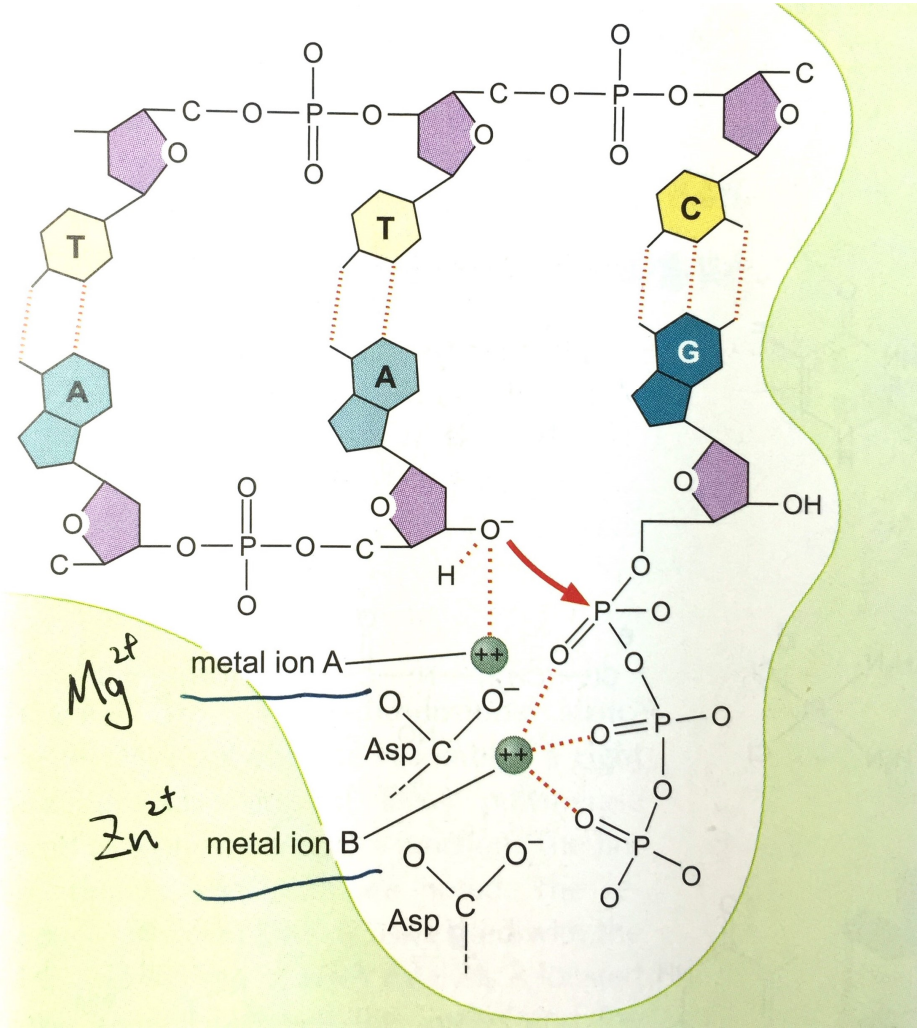


Chemical mechanisms of DNA replication

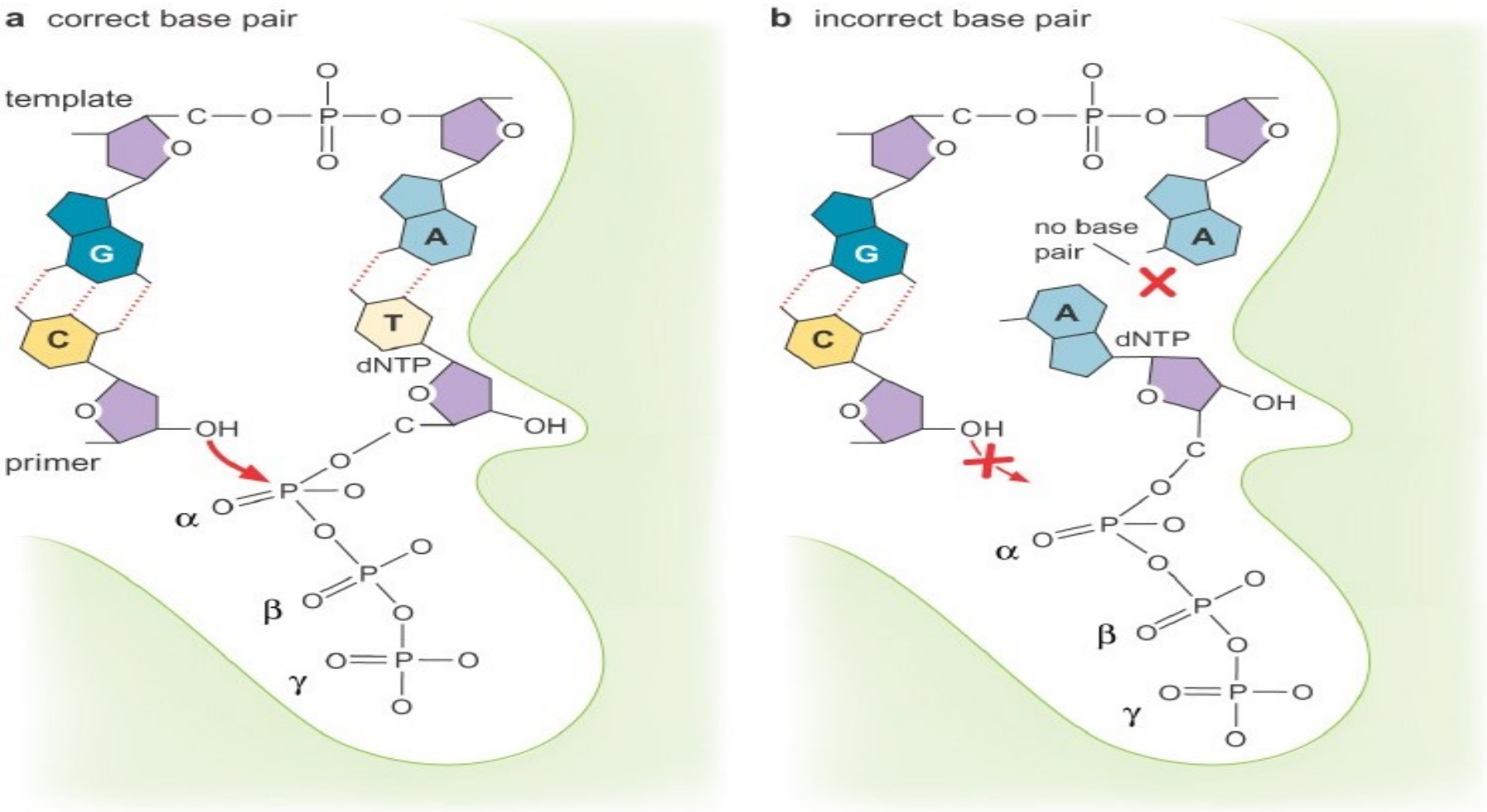


Mechanism of polymerization of DNA polymerase

- DNA polymerase binds the double strand, causing a conformational change that recruits free deoxynucleotides to pair with the template.
- With the assistance of metal ions (mostly Mg2+ or Zn2+), the affinity of the 3' hydroxyl oxygen and 5' phosphate groups is increased.



Mechanism of polymerization of DNA polymerase



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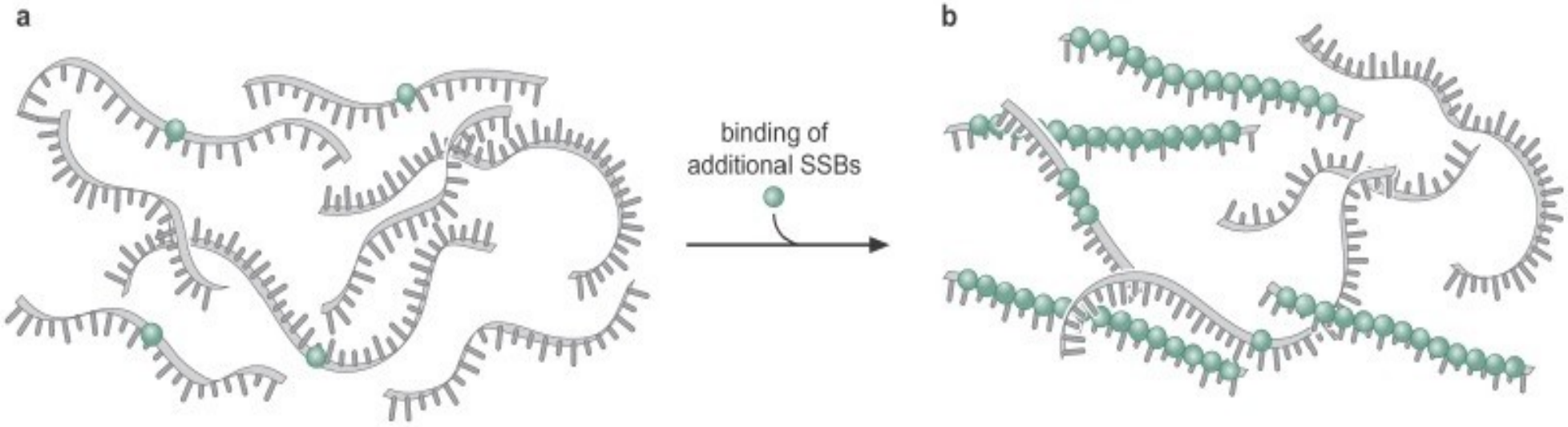
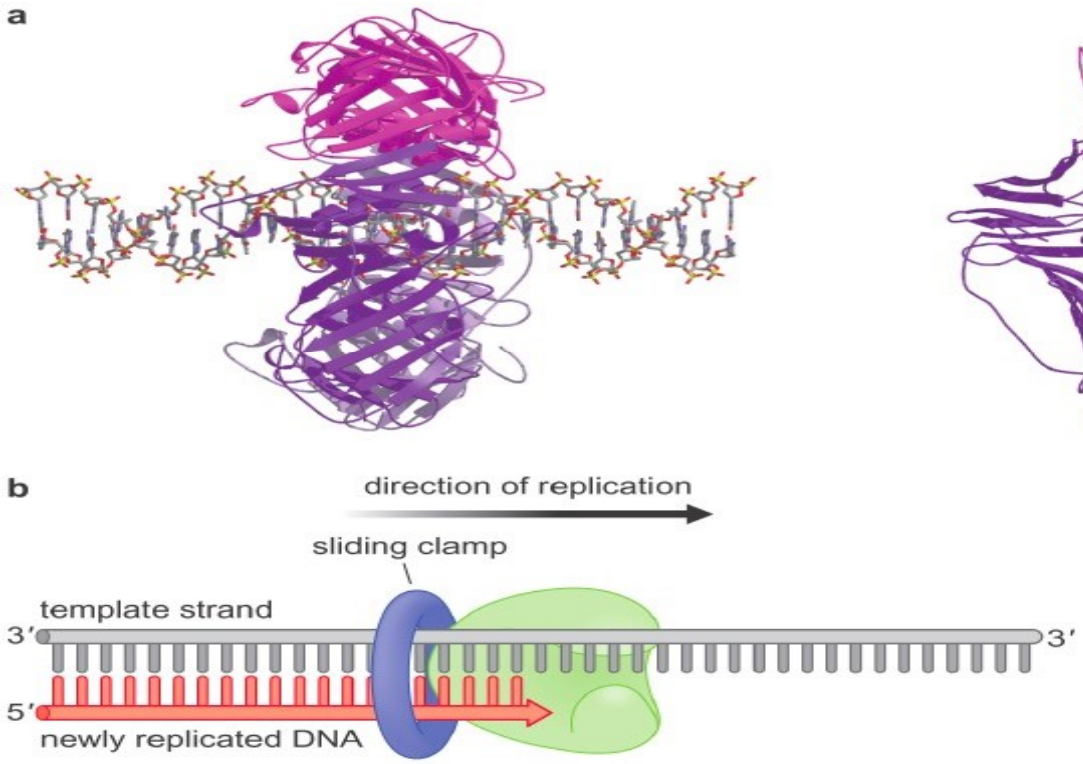
DNA Helicase

SSB: Stable single-stranded DNA

- ssDNA-binding proteins
- SSB without sequence specificity



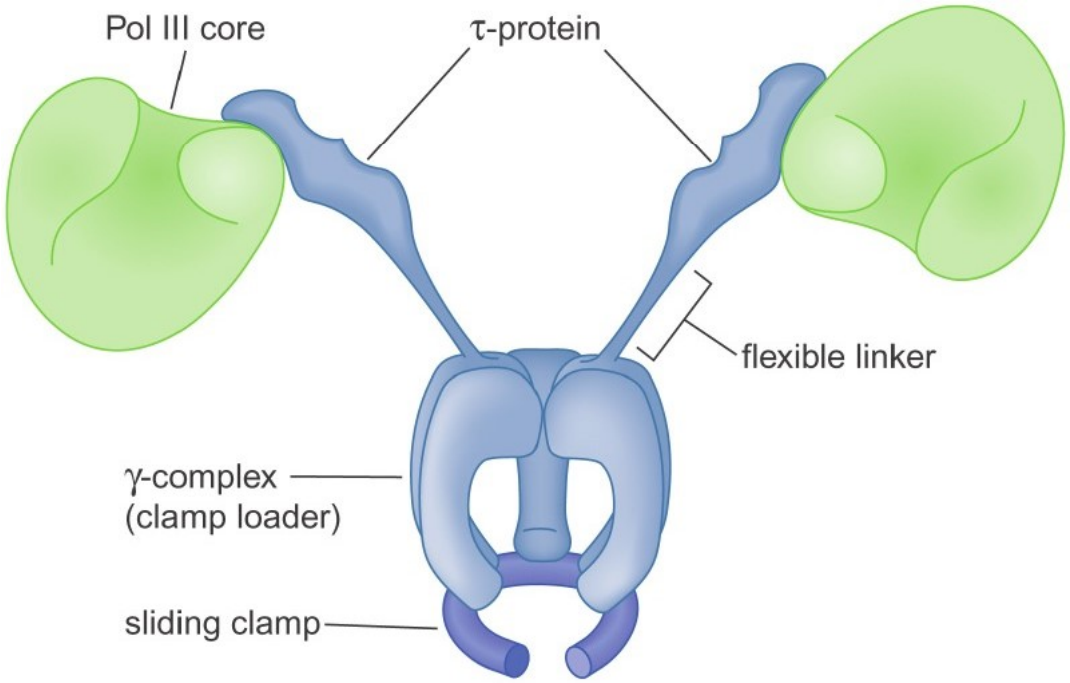
Sliding Clamps



Sliding clamp binds to DNA polymerase and helps the polymerase to slide on the DNA.

Clamp loader

- The Clamp loader is a protein scaffold that integrates the enzymes used for DNA replication.



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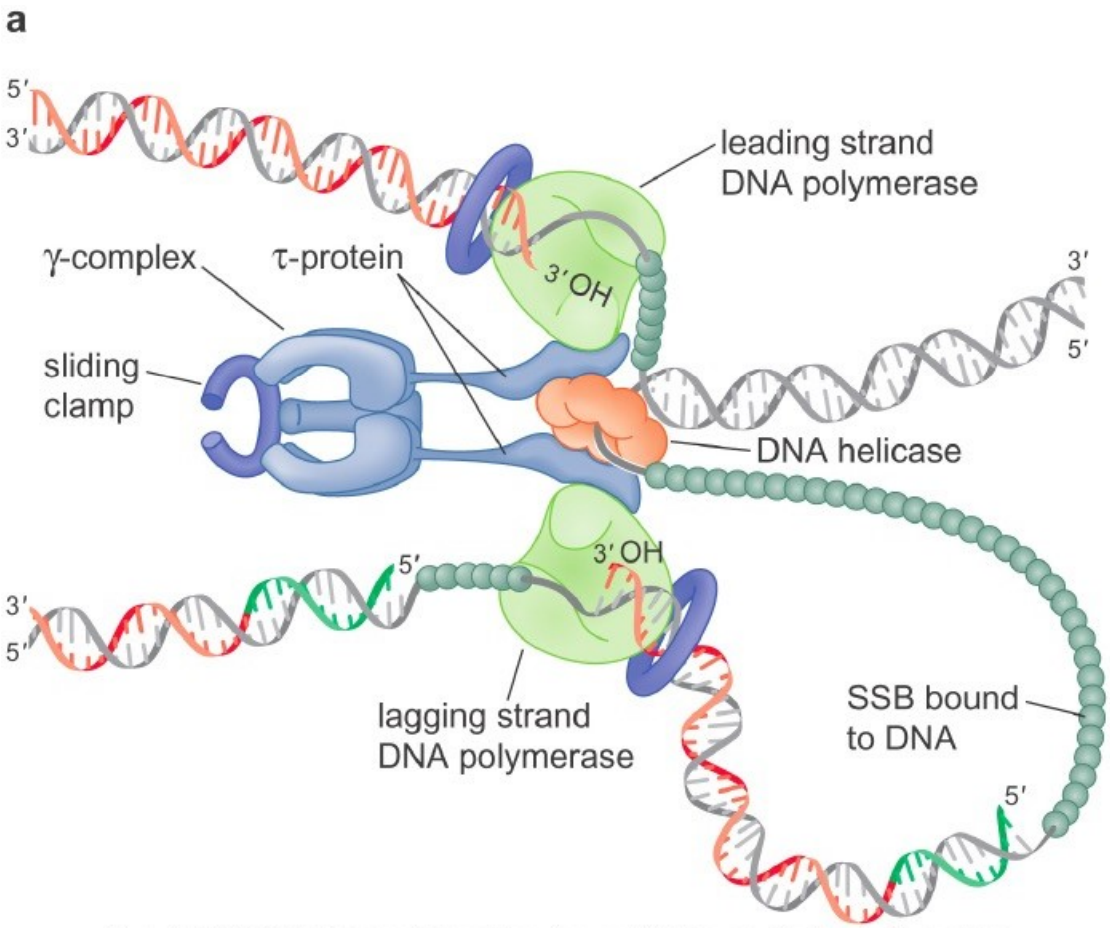
Enzyme collaboration in DNA replication

- Clamp loader binds enzymes required for DNA replication and extends with DNA unscrewing enzymes.



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Thanks.